



Environnement et  
Changement climatique Canada

Environment and  
Climate Change Canada

DM-219890

**MEMORANDUM TO DEPUTY MINISTER**

**STRATOSPHERIC OZONE MONITORING PROGRAM**

(For Information)

**PURPOSE**

To provide information about Environment and Climate Change Canada's current stratospheric ozone research and monitoring activities in support of domestic and international obligations, including the Montreal Protocol, as well as linkages to corollary work via Innovation, Science and Economic Development Canada (ISED) grants.

**SUMMARY**

- In the context of the upcoming Montreal Protocol meeting planned for Canada in November 2017, there has been renewed media attention regarding ECCC's past decisions on stratospheric ozone monitoring.
- This presents a good opportunity for ECCC to proactively communicate its current activities and commitments regarding stratospheric ozone monitoring.
- In 2011, Environment and Climate Change Canada contributed its share to efforts to return to a balanced budget. This action impacted resources available for atmospheric science programs including stratospheric ozone monitoring. However, Canada still continues to meet its domestic and international obligations.
- In parallel, the Natural Sciences and Engineering Research Council of Canada (NSERC) Climate Change and Atmospheric Research (CCAR) initiative supports (2013 to March 2018) academic-led research activities which complement but are independent of our stratospheric ozone monitoring activities.
- The results of the science-based review of ECCC's stratospheric ozone monitoring are expected by the end of September 2017, before the Montreal Protocol meeting in Canada.

**CONTEXT AND CURRENT STATUS**

Beginning in the 1960s, ECCC developed and implemented a number of monitoring stations in the Arctic, northern and southern mid-latitudes to monitor the levels of stratospheric ozone using two main methodologies – Brewer and ozonesonde (see background information). These sites constitute the core of the ongoing stratospheric ozone monitoring program. With this network, we are able to observe and understand long-term stratospheric ozone changes, monitor Arctic ozone depletion, contribute to satellite data validation and study ultraviolet radiation over Canada.

**Canada**

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In the 2000s, ozone measurements were initiated at four additional southern sites to primarily study the movement of tropospheric ozone across the Canada-US border and across the Pacific Ocean. Ozone measurements at two of these four sites were suspended in 2012. The suspension of the once-weekly measurements at Egbert, Ontario and Bratt's Lake, Saskatchewan did not affect our ability to meet our obligation to monitor stratospheric ozone.

In 2011, as part of work force adjustment (WFA), Environment Canada contributed its share to efforts to return to a balanced budget. This action impacted resources available for stratospheric ozone monitoring. Plans were to align atmospheric ozone monitoring, including the troposphere and stratosphere, towards an integrated and comprehensive national air monitoring approach to ensure key domestic and international commitments are addressed. The WFA reductions were managed at the program level. Scientific integrity of the core stratospheric ozone monitoring was maintained.

ECCC plans to complete the review of stratospheric ozone monitoring in order to inform the integration of monitoring operations into a larger network based on ECCC scientists' analyses. This will be completed by the end of September 2017 for planning/event purposes, and in advance of the Montreal Protocol meeting in November 2017.

In March 2017, in Geneva, Switzerland, Canada presented its national report on ozone research and monitoring activities at the meeting of the Ozone Research Managers to international colleagues and peers from other Vienna Convention member countries. The ECCC network is integrated in the international community through the World Meteorological Organization Global Atmosphere Watch Global Atmospheric Ozone Monitoring Network. No feedback on the Canadian program was received during the meeting.

The NSERC CCAR initiative is a grant program that supports climate change and atmospheric research at Canadian post-secondary institutions. This research forms the basis for conducting further studies and assessments of the social, economic and ecological impacts of climate change and for developing strategies and adaptation mechanisms. Even though the current CCAR efforts include stratospheric ozone research activities (see background) being conducted by universities, our stratospheric ozone monitoring efforts are not contingent on this program.

#### **ISSUE(S)**

Anticipate additional media attention resulting from recent media questions to ECCC. Recently media questioned ECCC's decisions about balancing stratospheric and tropospheric monitoring and the future role of ozonesonde measurements at Egbert and Bratt's Lake.

#### **CONSIDERATIONS**

ECCC is working on a communications plan to profile stratospheric ozone science activities in support of the Montreal Protocol meeting being held in Canada in November 2017. Current efforts are focused on showcasing (e.g., through a press release, social media, and as part of a video series on scientists) recent publications related to ultraviolet (UV) radiation exposure. These publications are collaborations between ECCC research scientists, Health Canada and Statistics Canada. A synopsis is being prepared on the science articles, including

exposure. These publications are collaborations between ECCC research scientists, Health Canada and Statistics Canada. A synopsis is being prepared on the science articles, including scientific value of the UV research and data products to ECCC and other Canadian government departments, and benefits to Canadians.

As part of the 30<sup>th</sup> Anniversary of the Montreal Protocol celebration, ECCC is planning a Science Panel Discussion with the UNEP Ozone Secretariat. The Panel Discussion will be held in an afternoon Plenary Session of the Joint 29<sup>th</sup> Meeting of The Parties to the Montreal Protocol and 11<sup>th</sup> Conference of the Parties to the Vienna Convention, with possible participation of 800 delegates. Recommendations have been drafted on discussion topics, panel members, and moderator. Formal invitations to panel members will be sent in early September. Recommended key topics are: Changing atmospheric composition and how it affects the ozone layer; ozone depletion and climate change; observations and monitoring needs for ozone layer protection and recovery; and HFCs and climate protection.

Monitoring of ground-level ozone (this ozone that contributes to smog) is through a network of stations located in urban, rural, and remote regions from the Canada-US border to the high Arctic. In addition to the remaining weekly ozonesonde profiles, ECCC monitors tropospheric ozone above ground level at a mountain site on Canada's west coast, through an ozone Lidar located in the Alberta Oil Sands, and through periodic aircraft campaigns.

  
George Erti

Assistant Deputy Minister  
Science and Technology Branch

c.c.: Associate Deputy Minister

## **BACKGROUND**

- Ozone is a gas that occurs in the Earth's upper atmosphere (stratosphere), in the lower atmosphere (troposphere) and at ground level. Tropospheric ozone, including ground level ozone, is considered an air pollutant when it exceeds natural levels, due to its negative effects on human health and plant life. In contrast, stratospheric ozone, or the ozone layer in the upper atmosphere, acts as a protective layer to life on the ground, by filtering harmful solar UV radiation.
- Any changes in the ozone layer such as ozone depletions taking place over the Canadian Arctic could affect UV levels across Canada and other countries. Our scientists monitor and report on ozone measurements in the upper atmosphere to track the state of stratospheric ozone, including depletion and long-term trend analysis and to ensure our meteorologists have the information required for accurate UV index forecasts. ECCC helps to fulfil Canada's domestic and international obligations under the Vienna Convention for the Protection of the Ozone Layer and its Montreal Protocol on Substances that Deplete the Ozone Layer.

## **Historical Monitoring Timeline**

- Beginning in the 1960s, three Arctic and three northern mid-latitude sites were established to measure stratospheric ozone. Both Brewer and ozonesonde techniques are used at these six stations to inform on the state of stratospheric ozone including ozone depletion and long-term trend analysis. Two additional southern mid-latitude stations monitor total column ozone via the Brewer technique (Toronto, which is also supporting the World Meteorological Organization's Brewer World Calibration Centre, and Saturna Island). These stations form the core of the stratospheric ozone monitoring program.
- During the 2000s, ozonesonde measurements were also initiated at four southern mid-latitudes stations primarily to study tropospheric ozone and transboundary transport of ozone. These stations have also been used for stratosphere – troposphere ozone exchange and satellite data validation.
- In 2012, measurements at two of the southern mid-latitude sites were suspended (Bratt's Lake, SK; Egbert, ON). Ozonesonde profiles at these two sites contributed primarily to tropospheric ozone monitoring. The suspension of the once-weekly measurements did not affect our ability to meet our international obligation to monitor stratospheric ozone.
- ECCC continues to operate the World Brewer Calibration Centre and hosts, through Meteorological Service of Canada, the World Ozone and Ultra-violet (UV) Data Centre (WOUDC).

## **2011-12 Budget Impacts Resulting from the Work Force Adjustment**

- The 2011-12 ECCC budget reductions impacted resources available for the atmospheric science programs including the stratospheric ozone monitoring program. As a result, monitoring of stratospheric and tropospheric ozone was focused on meeting primary reporting needs and addressing our domestic and international commitments.
- ECCC is committed to reviewing the Brewer and Ozonesonde networks as part of a broader air quality monitoring review in order to achieve a sustainable monitoring program factoring in the needs of our clients and Canadians, scientific integrity and operational efficiency while maintaining continued engagement on key domestic and international commitments are addressed.

**ECCC & the NSERC CCAR initiative** (as related to ozone research activities)

- University researchers have leveraged funding (2013-2018) to carry out research projects at the Polar Environment Atmospheric Research Laboratory (PEARL) Ridge Laboratory through the Climate Change and Atmospheric Research (CCAR) program of the Natural Sciences and Engineering Research Council (NSERC).
- The university consortium working out of the PEARL facilities (Ridge Lab (ECCC owned), Zero-altitude PEARL Auxiliary Laboratory (OPAL) and Surface and Atmospheric Flux, Irradiance and Radiation Extension (SAFIRE) (not owned by ECCC), provides data for satellite validation, tracking of changes in Arctic atmospheric composition, and instrument development and demonstration. Direct benefits to ECCC and to the scientific community also include the training of high qualified personnel, data analysis, and publication of results. Should the consortium activities at these facilities be suspended due to lack of funding, ECCC will continue stratospheric ozone program operations from the Eureka Weather Station and will continue to meet the obligations of the UV Index and stratospheric ozone program.